

1. An electric fluid dispenser for dispensing a fluid onto a substrate comprising:

a dispensing valve movable between open and closed positions for controlling a flow of the fluid from said fluid dispenser;

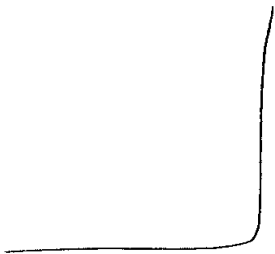
5 a source of power providing a nonconstant voltage;

a power switching circuit electrically connected to the nonconstant voltage;

a solenoid electrically connected to said power switching circuit and mounted adjacent said dispensing valve, said solenoid being capable of causing said dispensing valve to move between the open and closed positions; and

10 a control circuit responsive to the nonconstant voltage and <sup>said drive signal</sup> providing a drive signal to said power switching circuit having a time variable component determined by the nonconstant voltage from the source of power, said power switching circuit in response to said drive signal providing an output signal to the solenoid causing said dispensing valve to move between the open and closed positions substantially independent of variations in the nonconstant voltage.

$t(v)$   $\rightarrow$  output



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2. The electric fluid dispenser of claim 1 wherein said control circuit provides said drive signal with a time variable component automatically varying as a function of the variations of the nonconstant voltage of said power source.

a 3. The electric fluid dispenser of claim 2 wherein said control circuit provides said drive signal with a time variable component automatically varying as an inverse function of the variations of the nonconstant voltage of said power source.

4. The electric fluid dispenser of claim 3 wherein said control circuit provides an initial peak current followed by a hold current to energize said solenoid, and said control circuit providing said initial peak with an initial duty cycle varying as an inverse function of the variations of the nonconstant voltage of said power source.

5. A driver circuit for an electrically operated fluid dispenser dispensing a fluid onto a substrate, the fluid dispenser having a dispensing valve movable between open and closed positions for controlling a flow of the fluid from the fluid dispenser and a solenoid operatively connected to the dispensing valve and capable of moving the dispensing valve between the open and closed positions, the driver circuit comprising:

a power source providing a nonconstant voltage;

a power switching circuit connected to the nonconstant voltage;

and

a control circuit responsive to the voltage of the power source for providing a drive signal to said power switching circuit having a time variable component determined by the magnitude variations of the nonconstant voltage, said power switching circuit providing, in response to said drive signal, a current to the solenoid and causing the solenoid to operate substantially independent of the magnitude variations of the nonconstant voltage from said power source.

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driver circuit of claim 5 wherein said dc voltage is followed by a hold current to energize said power switching device during said initial peak current at a modulation duty cycle dependent function of the magnitude variations in the nonconstant input voltage.

driver circuit of claim 6 wherein said dc voltage is followed by a hold current at a modulation duty cycle dependent function of the magnitude variations of the nonconstant input voltage.

driver circuit of claim 7 wherein said dc voltage is followed by a hold current supplied to said power switching device during said initial peak current at a modulation duty cycle dependent function of the magnitude variations of the nonconstant input voltage.

7. The driver circuit of claim 6 wherein said control circuit initiating said initial peak current at a modulation duty cycle determined as an inverse function of the magnitude variations of the nonconstant voltage of said power source.

8. The driver circuit of claim 7 wherein said control circuit limiting an initial current being supplied to said power switching circuit as an inverse function of the magnitude variations of the nonconstant voltage of said power source.

[illegible]

9. A driver circuit for an electrically operated fluid dispenser dispensing a fluid onto a substrate, the fluid dispenser having a dispensing valve movable between open and closed positions for controlling a flow of the fluid from the fluid dispenser and a solenoid operatively connected to the dispensing valve and capable of moving the dispensing valve between the open and closed positions, the driver circuit comprising:

a power switch adapted to be connected to a power source voltage having magnitude variations;

a duty cycle control responsive to the power source voltage having the magnitude variations;

a pulse width modulator ("PWM") connected to said duty cycle control and providing a drive signal to said power switch having a peak current with a leading edge modulated at a duty cycle varying as an inverse function of the magnitude variations of the power source voltage, said power switch, in response to said drive signal, providing an output signal to the solenoid causing the dispensing valve to move from the closed to the open positions substantially independent of the magnitude variations of the power source.

10. A method of operating a fluid dispenser for dispensing a fluid onto a substrate, the fluid dispenser having a dispensing valve being movable between open and closed positions for controlling a flow of the fluid from the fluid dispenser, a solenoid having a coil in electromagnetic communication with an armature being movable through a displacement by energizing the coil, the operation of the solenoid being effective to cause the dispensing valve to move between the open and closed positions; the method comprising:

providing a power switching circuit electrically connected between the solenoid and a power source supplying a varying voltage;

producing a drive signal having a time variable component determined as an inverse function of the varying voltage of the power source; and

applying the drive signal to the power switching circuit, thereby causing the dispensing valve to move between the open and closed positions substantially independently of the varying voltage of the power source.

11. A method of operating an electrically operated fluid dispenser for dispensing a fluid onto a substrate, the fluid dispenser having a dispensing valve operatively connected to an electrically operated solenoid, the dispensing valve being movable between open and closed positions for controlling a flow of the fluid from the fluid dispenser, the method comprising:

providing a power switching circuit adapted to be connected to a power source supplying a varying voltage;

producing a drive signal with a time variable component determined as a function of the varying voltage of the power source; and

applying the drive signal to the power switching circuit to operate the solenoid and dispensing valve substantially independently of the varying voltage of the power source.

12. The method of claim 11 wherein the drive signal has an initial peak current followed by a hold current, and the method further comprises initially modulating the initial peak current at a duty cycle determined as an inverse function of the varying voltage of the power source.

13. The method of claim 12 further comprising modulating a leading edge of the initial peak current at a duty cycle determined as an inverse function of the varying voltage of the power source.

14. A method of operating an electrically operated fluid dispenser for dispensing a fluid onto a substrate, the fluid dispenser having a dispensing valve operatively connected to an electrically operated solenoid, the dispensing valve being movable between open and closed positions for controlling a flow of the fluid from the fluid dispenser, the method comprising:

- 5 providing a power switching circuit connected to an unregulated power source supplying a varying voltage;
- 10 producing a drive signal having an initial peak current followed by a hold current;
- modulating a leading edge of the initial peak current with a duty cycle determined as an inverse function of the varying voltage of the unregulated power source; and
- 15 applying the initial peak current to the solenoid to operate the solenoid and the dispensing valve with an operational speed independent of the varying voltage of the unregulated power source.